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Evaluation of Italian Judicial System

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Abstract

Italy is frequently reprimanded by the European Court of Human Rights (ECtHR) over the amount of time it takes Italian courts to reach verdicts. As stated by President Giorgio Napolitano, European Court decisions have lead to calls for an urgent intervention in order to save time and costs in Italian judicial system. Efficiency and effectiveness are key targets for managing justice in Italy. Nevertheless they are not easy to achieve. In this paper, using a Stochastic Frontier Model (SFM) we compare the Italian courts efficiency to identify strong and weak points.

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Keywords: Justice, Efficiency, Stochastic Frontier Models.

1. The justice efficiency

Since the late 1990s, the increased role of judiciaries in society and the increasing demand from taxpayers and voters, for the state to be operated more efficiently and at less of an expense (both emotional and financial) to the people, started to affect the traditional ideas and impressions of the judicial administration, its organization and its founding values. Before then, we had not given much thought as to how access to justice was organized, because it was taken for granted, that if judicial independence were guaranteed, then access to justice would also be guaranteed. Bureaucracies in general, and judicial administrations in particular, were increasingly seen as an old and monstrous machine, with much red tape and in need of much repair. Furthermore, it was often impossible for people to know who was responsible for what, which made having to go to the state with their issues time-consuming and frustrating.

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Evidence-based programming requires that programme outcomes be monitored and evaluated, in order to determine whether the programme's objectives have been achieved. It also requires that evaluation findings be reviewed and integrated into future programming and that good practices and lessons learned through the conduct of previous programmes be identified and taken into account in designing future interventions. In order to carry out all those steps, sound measuring techniques and processes and clear criteria for measuring programme outcomes are required.

The main objective of the present publication is to provide some statistical techniques useful for evaluating the efficiency of the Italian Judicial System.

Experts consider the Italian Judicial System chaotic and rather poorly managed: busy, too many transactions and high costs. According to the Bank of Italy, the inefficiency of the Italian Justice System, in economic terms, accounts for 1% of GDP. The compensation for the sluggard justice, rose from 5 million euro in 2003, to 40 million in 2008, reaching 84 million in 2011.

Italy is frequently reprimanded by the European Court of Human Rights (ECtHR) over the amount of time it takes Italian courts to reach verdicts. Furthermore, in May 2013, the ECtHR set Rome a one-year deadline to find a solution to chronic overcrowding in Italy's jails. Italian prisons are more than 15% over capacity and overcrowding is a factor in high suicide rates.

The Justice Minister Cancellieri said in the Lower House in January 2014:

> *"The system is struggling despite the response of the Italian judiciary, which came first in terms of productivity in the latest EU report on justice efficiency. Higher workloads (in terms of criminal and civil cases) and greater scope of action for the magistrates are at the origins of the slowness of the verdicts and fears that the overexposure of the judiciary can alter the delicate balance between powers of the State".*

The minister said that Italy's courts were faced with over eight million outstanding cases in June 2013, 5.2 million civil ones and almost 3.5 million criminal ones.

As for overcrowding, she said moves to grant early release for less serious crimes and the use of alternative punishments to jail had helped reduce the prison population. She said there were 62,326 inmates on January 9, 2014 compared to 64,056 on December 4, 2013. President Giorgio Napolitano has repeatedly called for amnesties to help improve conditions in Italy's jails.

The experts agree that judicial system ought to be efficient, effective and fair, but they do not agree about the suggested way to improve it.

The Italian government is planning to cut expenses and to measure justice efficiency, according to the best practices performed by some other courts (Cook, 1982, Sciacca, 2007).

The Public Administration and Innovation Minister with the CSM Vice President signed a document to change justice governance and to evaluate magistrates observing the Best Practices Project according to CAF (Common Assessment Framework) for Justice.

In this paper we compare the 26 Italian appellate Courts using a Stochastic frontier Model in order to estimate their efficiency and to analyze the causes of deviations from the maximum efficiency.

The data (exhausted civil and criminal judgments in a year, for each of the 26 Appellate Courts) comes from Ministry of Justice official website (www.giustizia.it). The number of exhausted cases is a proxy of the output of the judicial system and it can be used to produce an annual ranking of the courts' productivity.

We compare inhomogeneous entities, therefore joining civil and criminal processes in the same analysis and using the costs for each court as a dimensional indicator could be dangerous or inappropriate. Nevertheless it is a first step in analyzing a complex phenomenon.

Another weak aspect lies in the poor consideration of contextual factors for the different courts, for which the number of occurring cases is an exogenous factor. Unfortunately, the available data only allows us to make just a summary analysis of the phenomenon and can generate misleading conclusions.

For this reason the results presented below should be interpreted as a first stage of a more complex analysis.

2. The justice system

The overall budget of the Italian justice system is 7,716,811,000 euros. This includes the budget for the court system, legal aid, public prosecution services, prison system, probation services, judicial protection of juveniles and functioning of the Ministry of Justice.

There are 6,654 professional judges sitting in ordinary and administrative courts, including 5,366 at first instance, 993 at second instance and 295 at highest instance. There are no professional judges sitting in courts on an occasional basis. In addition to professional judges, there are 3,121 non-professional judges performing various judicial functions in first instance in Italy.

Of the 24,661 non-judge staff units of personnel who are working in ordinary and administrative courts, for 9,699 the main tasks are: to assist judges with case file preparation (during and outside of court hearings), recording court proceedings, helping to draft the decisions, and the execution other activities necessary for the smooth running of court proceedings. Another 107 units are in charge of different administrative tasks and of the management of the courts (management of human resources, as well as of premises and equipment, including computer systems, financial and budgetary management, training management).

Finally, there are 702 technical staff and another 14,153 units working as assistants, receptionists, porters and other judicial staff. In Italy the ratio of professional judges sitting in courts to non-judge staff who are working in court is 1 to 3.7.

3. The measurement of efficiency

In order to measure the degree of efficiency of a unit it is necessary to define the production frontier, which identifies the set of the best combinations of inputs.

Recent interest in estimating inefficiency arises out of concerns about the justice delays. There are many potential applications for accurate provider-level estimates of inefficiency (e.g., organizational improvement, public reporting). There are various systems used for studying efficiency either by using an unidimensional or a multidimensional approach (Fig. 1)

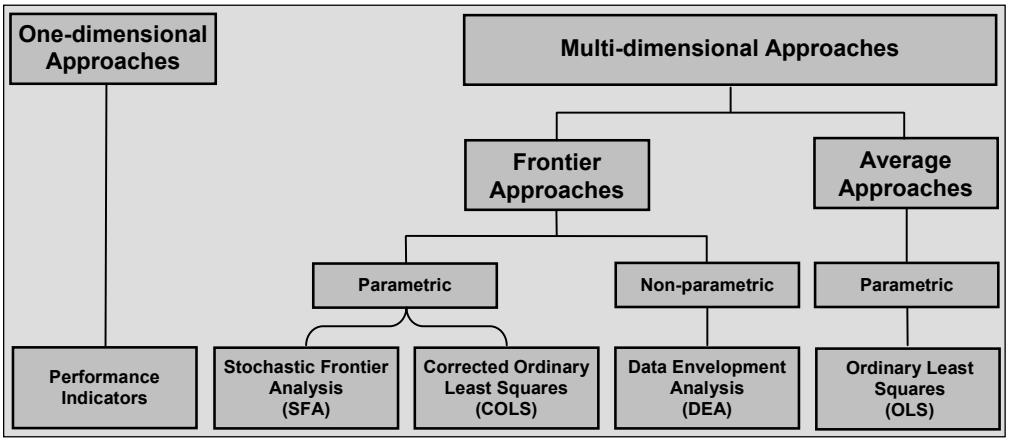

Fig. 1. Approaches to Inefficiency Estimation .

Following a multivariate approach, among the econometric techniques that generates provider-level (i.e. Justice court-level) estimates of inefficiency, we can measure efficiency as a departure from a frontier or by evaluating the difference with respect to average values.

A parametric or non–parametric approach can be followed, leading to Stochastic Frontier Analysis and to Data Envelopment Analysis respectively.

We used the Data Envelopment Analysis (Charnes *et al.*, 1978) for a similar model (Antonucci *et al.*, 2011), but in this paper we apply the SFA technique (Aigner *et al*., 1977; Meeusen & van den Broeck, 1977).

This technique, widely used to estimate individual efficiency scores, defines the production technology for a particular industry using a stochastic production frontier in which output is expressed as a function of inputs, a random error component and a one-sided technical inefficiency component which captures deviations below the optimal output level (frontier).

A stochastic frontier model is often written as:

$$q = f(x_1, x_2, \ldots, x_N) + \nu - u$$

where :

- q represents the general production function obtained from the input factors $x_1, x_2, \ldots, x_N$;
- ν is the noise component, that describes random shocks affecting the production process. These shocks are not directly attributable to the producer or the underlying technology. Each producer is facing a different shock, but we assume the shocks are random. Usually it is a two-sided normally distributed variable. Standard assumptions of zero mean, homoscedasticity and independence is assumed.
- u is the non-negative technical inefficiency component, which represents technical inefficiency to a general production function. This means that actual output is less than what is postulated by the production. The u_i are identically and independently distributed non-negative half normal (truncated at 0) random variables.

The components v and u are independently distributed and constitute a compound error term, with a specific distribution to be determined, hence the name of "composed error model" as is often referred.

Often a Cobb–Douglas function is used to model the production function.

It represents the technological relationship between the amounts of two or more inputs, particularly physical capital and labour, and the amount of output that can be produced by those inputs. The Cobb-Douglas form was developed and tested against statistical evidence by Charles Cobb and Paul Douglas during 1927–1947:

$$q_i = \exp(\beta_0 + \beta_1 \ln x_{1i} + \beta_2 \ln x_{2i}) \cdot \exp(v_i) \cdot \exp(-u_i) .$$

So the stochastic frontier model can be written as:

$$\ln q_i = \beta_0 + \beta_1 \ln x_{1i} + \beta_2 \ln x_{2i} + v_i - u_i \ .$$

In general, a stochastic frontier model with several inputs and general functional form (which is linear in its parameters) is generally written as

$$\ln q_i = \ln \boldsymbol{x_i'\beta} + v_i - u_i .$$

By construction, the inefficiency term is always between 0 and 1. This means that, if a firm is inefficient, then it produces less than what is expected from the inputs used by the firm at the given technology.

Technical efficiency can be defined as the ratio of "observed" ("realised") output to the stochastic frontier output

$$TE_i = \frac{q_i}{\exp(\mathbf{x}_i'\boldsymbol{\beta} + v_i)} = \frac{\exp(\mathbf{x}_i'\boldsymbol{\beta} + v_i - u_i)}{\exp(\mathbf{x}_i'\boldsymbol{\beta} + v_i)} = \exp(-u_i) .$$

The inefficiency effects model was formulated and estimated jointly with the Cobb-Douglas stochastic frontier model in a single stage maximum likelihood estimation procedure, using the computer software Frontier Version 4.1 (Coelli, 1996). Here, the parameterization of Battese and Corra is used, replacing σ_V^2 and σ_U^2 with

$$\sigma^2 = \sigma_V^2 + \sigma_U^2 \qquad \text{and} \qquad \gamma = \sigma_U^2/(\sigma_V^2 + \sigma_U^2).$$

This is done by calculating the maximum likelihood estimates.

4. The Model

In order to measure the efficiency of the Justice system we considered the demand and the offer of justice services, and the resources available in terms of number of professional judges. The data presented in this paper (Table 1) comes from General Statistic Directorate of the Ministry of Justice. This office belongs to SISTAN and offers certified data but the latest figures available are referred to 2011 (2 years delay). The number of judges represented comes from CSM (Superior Council of Magistracy) that gives an updated list of the judges in service at the different offices but does not allow us to recover the history of the data stream of the previous years.

Table 1. Number of resolved and pending civil, commercial and criminal cases, and number of professional judges sitting in courts, year 2011.

District	*Resolved cases* (Y_i)	*Pending cases* (X_{1i})	*Judges* (X_{2i})
Ancona	188,057	155,589	150
Bari	334,359	573,272	388
Bologna	495,864	464,121	393
Brescia	277,880	280,482	226
Cagliari	178,437	214,728	218
Caltanissetta	49,369	59,238	98
Campobasso	47,803	44,771	52
Catania	209,967	302,218	294
Catanzaro	232,949	362,763	245
Firenze	426,874	426,293	392
Genova	233,599	222,024	280
L'Aquila	194,491	173,071	174
Lecce	266,185	338,785	160
Messina	114,804	192,188	136
Milano	735,236	598,757	750
Napoli	1,012,766	1,414,309	924
Palermo	229,164	264,184	395
Perugia	112,577	123,411	93
Potenza	74,004	108,224	89
Reggio Calabria	96,224	155,700	173
Roma	914,831	1,363,432	1299
Salerno	179,153	303,548	183
Torino	465,070	375,492	487
Trento	95,154	47,967	124
Trieste	142,251	87,086	156
Venezia	419,935	408,641	342
Sum	**7,727,003**	**9,060,294**	**8,221**

The variable Y_j (output) is the number of resolved civil, commercial and criminal cases, during year 2011. The input variables are:

X_{1i}: Number of pending civil, commercial and criminal cases, year 2011
X_{2i}: Number of professional judges sitting in courts, year 2011

The Cobb-Douglas production function with one output Y_j and 2 inputs X_{1i} and X_{2i}, assuming a half- normal distribution for Technical Inefficiency, gives the estimates shown in Table 2. The LR test ($9.39 > \chi^2_{0.025}$ with 3 df) indicates the presence of a significant Technical Efficiency.

Table 2. Estimates of the parameters and standard errors of the Cobb-Douglas production function (with 2 inputs and 1 output).

Parameters	*Estimation*	*Std.err..*	*t-ratio*
β_0	1.730	0.2506	6.905
β_1	0.729	0.0360	20.256
β_2	0.225	0.0434	5.184
σ^2	0.049	0.0422	1.156
γ	0.989	0.002	647.364

Table 3. Estimated Technical Efficiency and rank of the Italian courts.

District	*Estimated Technical Efficiency*	*Rank*
Milano	0,997	1
Bologna	0,995	2
Trento	0,990	3
Trieste	0,988	4
Ancona	0,986	5
Torino	0,977	6
Venezia	0,966	7
L'Aquila	0,946	8
Brescia	0,932	9
Firenze	0,927	10
Lecce	0,916	11
Genova	0,873	12
Perugia	0,870	13
Napoli	0,866	14
Campobasso	0,833	15
Cagliari	0,775	16
Roma	0,767	17
Palermo	0,745	18
Catanzaro	0,737	19
Catania	0,709	20
Bari	0,703	21
Potenza	0,696	22
Messina	0,675	23
Salerno	0,674	24
Caltanissetta	0,665	25
Reggio Calabria	0,617	26
Mean (Median)	*0.839 (0.868)*	

The stochastic frontier function for the i^{th} Court is therefore

$$q_i = \exp(1.73 + 0.73 \ln x_{1i} + 0.22 \ln x_{2i} + \nu_i - u_i) = 5.64 \times 2.07 x_{1i} \times 1.25 x_{2i} + \exp(\nu_i - u_i) .$$

Using the above model, the technical efficiency is estimated by the ratio of the observed output divided by theoretical output, as shown in Table 3.

The mean efficiency is 0.84, but there are remarkable differences among courts.

The courts of Milano Bologna and Trento are the most efficient because they are on the frontier. The courts of Trieste Ancona e Torino, have also demonstrated high performance levels. It easy to verify that the Southern-Italian

districts are in the lower half of the list, with the Court of Lecce as the only exception. This confirms the existence of a North-South divide with respect to efficiency of the Justice System. The District of Lecce holds the national record of 1,664 cases solved for each judge. It is more than 3 times the number *per capita* of cases solved in Caltanissetta (504).

The biggest Italian districts, Naples (0.87) and Rome (0.77), are not very efficient.

In the second part our table we have only Southern-Italian Districts, particularly Reggio Calabria, whose efficiency is few more than 60% of that of Milano.

5. The internal determinants of Courts efficiency

The stochastic frontier model does not allow to find the determinants of Courts efficiency, for this reason we decided to use a decision tree as a predictive model.

The goal of decision trees is to predict or explain responses on a categorical dependent variable. A tree can be "learned" by splitting the source set into subsets based on an attribute value test and this process is repeated on each derived subset in a recursive manner called "recursive partitioning". The recursion is completed when the units in a node have all the same value of the target variable, when splitting no longer adds value to the predictions or when the tree reach some "a priori" limits, given by the researcher (Breiman et al., 1984). This process of *top-down induction of decision trees* is by far the most common strategy for learning decision trees from data.

We applied the C*a*RT algorithm of SPSS with minimum 2 cases in parent nodes and 1 case in child nodes: this low critical values are typical when "ecological units" (that is, units which contains all the observed cases of the population, not mere samples: this is the case here described) are analyzed. Such classification algorithm is able to find the best cut off points for the continuous variables.

The segmentation analysis of the Courts (assumed as "ecological units") was done using, as response variable, both the Technical Efficiency (see Tab. 3) and its binary classification, obtained considering the median value of 0.868 as a cut-off point and classifying the Courts with a Technical Efficiency under and over the median. The results of the two trees are very similar, and therefore only the results obtained with the binary classification here are described, because they are clearer.

The classification tree has 13 nodes, in 5 levels, with 7 terminal nodes (as said, the same results of the regression tree obtained using the Technical Efficiency). The segmentation levels measure the main part of importance of the involved variables.

Table 4. Independent Variable Importance.

Independent Variable	*Importance*	*Normalized Importance*
Percentage of vacancies	0.302	100.0%
"per capita" expenditures	0.248	82.3%
"per capita" tapping	0.131	43.3%
"per capita" procedure charge	0.110	36.5%

The most important variable of this tree is the percentage of vacancies, obtained dividing the number of vacancies of the Courts by the number of judges in service. The 5 Courts that have a % of vacancies below 12.83 have a Technical Efficiency above the median. The 21 Courts with a % of vacancies above 12.83 need more information to be classified.

The five Courts with expenditures *per capita* (for judge in service) under 69,424 Euros for judge, have a estimated technical efficiency below the median, while the others are not easy to classify. For this reason we have to further distinguish the Courts with a *per capita* expenditure less the 94,322 Euros, that are more efficient, from the Courts with a higher expenditure *per capita*, that are less efficient. For the first group of Courts, then, it is important the number of tapping *per capita*: in fact, the five Courts with more then 12.31 interceptions *per capita* are more efficient with respect to the others.

The nine Courts with per capita expenditures higher than 94,322 Euros can be considered efficient if have a percentage of vacancies below 14.87, and not efficient if the percentage of vacancies is above that limit.

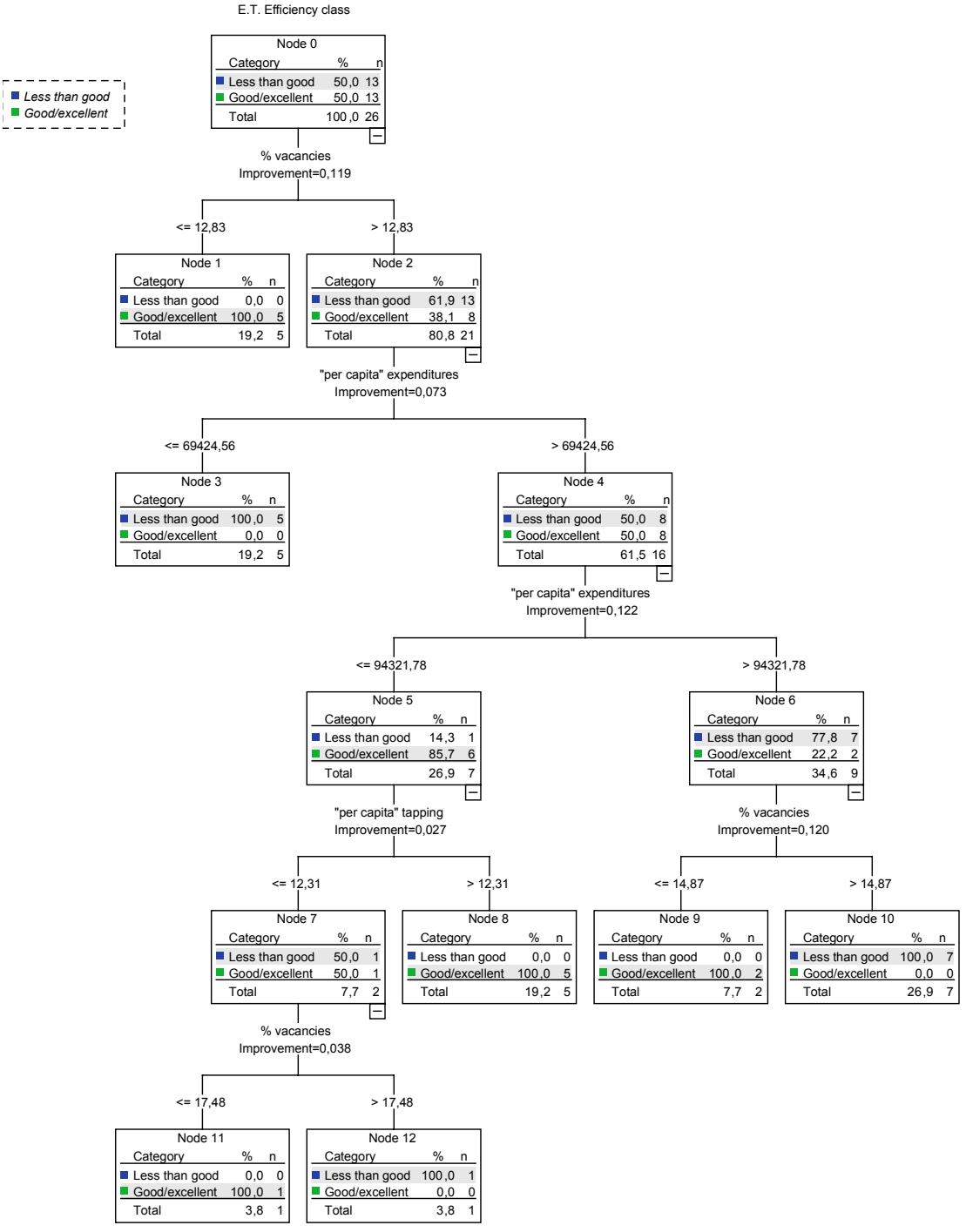

Fig. 2. Classification tree of Estimated Technical Efficiency of the Italian Justice Courts.

We can say that the efficiency of a Court depends first of all by the percentage of vacancies, which has various critical values, based on the other characteristics, secondly by the *per capita* expenditures of the Court (which might be not too low, and not too high); only marginally, the Court efficiency depends by the per capita interceptions.

This results confirms that the Italian Judicial System need more resources in order to extinguish the large number of pending procedures. During this economic crisis period it is very difficult to find resources to solve this problem, for this reason the Italian authorities have taken a number of measures to address the inefficiencies and bottlenecks in the functioning of the justice system These include measures to reduce case inflow (e.g., by increasing Court fees, creating appeal barriers, and changing lawyers' fee).

6. Final remarks

This study is only a first attempt in analysing the phenomenon and has many areas for criticism.

First of all, the lack information about the costs of civil and criminal justice forced us to consider together two systems that have many differences. Secondly, the districts considered for our analysis are quite big, so in the same area we can see efficient and inefficient units.

The available data is unable to illustrate the causes of inefficiency, due to the lack of detailed data about cost of a single procedure, of administrative staff and/or the resources applied to the various procedures.

Also, in order to analyze the efficiency of the different offices, the contextual factors must be considered. The court of Milan, which largely uses investigative techniques based on wiretaps to contrast corruption in public affairs and laundering money, cannot be compared with other districts with lour criminality

It may prove interesting to conduct further research into estimates of separate models for civil, commercial and criminal cases and to consider cost frontier functions.

The "Destination Italy" initiative presented in September 2013 reaffirms the government's commitment to tackle the problems in the judicial system. The National Reform Program, outlining Italy's targets towards the Europe 2020 strategy; includes measures to:

- Extend the competences of the commercial courts to all commercial litigation;
- Introduce restrictions to appeals;
- Allow parties to a mediation not to be assisted by a lawyer;
- Extend the competences of judges of the peace;
- Ensure the full operativity of the "e-civil process" (so-called "Processo Telematico Civile") by June 2014;
- Complete the "data warehouse" project
- Monitor the implementation of the Administrative Procedure Code.

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